PB-235 280

MANUAL FOR PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS FOR WASTEWATER TREATMENT WORKS, FACILITIES PLANS, AND 208 AREAWIDE WASTE TREATMENT MANAGEMENT PLANS

Peter L. Cook, et al

Environmental Protection Agency
Washington, D. C.

August 1973

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

BIBLIOGRAPHIC DATA SHEET	1. Report No.	2	PB 235 280

4. Title and Subtitle Manual for Preparation of Environmental Impact Statements for Wastewater Treatment Works, Facilities Plans, and 208 Areawide Waste Treatment Management Plans	5. Report Date August 1973 - Date of issu 6.
7. Author(s) Peter L. Cook and Ned Cronin	8. Performing Organization Rept. No. N/A
9. Performing Organization Name and Address Environmental Protection Agency, A-104 Office of Federal Activities 401-M Street S.W., Rm. 537WT Washington, D.C. 20460	10. Project/Task/Work Unit No. N/A 11. Contract/Grant No. N/A
12. Sponsoring Organization Name and Address Same as above.	13. Type of Report & Period Covered Final 14.

15. Supplementary Notes

16. Abstracts

The volume presents detailed guidance for the preparation of environmental impact statements on wastewater treatment works and related plans.

17. Key Words and Document Analysis. 17a. Descriptors

Environmental Impact Statement
Wastewater treatment work
Facilities Plan
208 Areawide Waste Treatment Management Plan
Environmental Assessment
Primary or direct Impacts
Secondary or induced Impacts

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Release unlimited	UNCLASSIFIED	43
	20. Security Class (This Page) UNCLASSIFIED	22. Price 3.25-1.45

MANUAL FOR PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS FOR WASTEWATER TREATMENT WORKS, FACILITIES PLANS, AND 208 AREAWIDE WASTE TREATMENT MANAGEMENT PLANS

Office of Federal Activities

U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
JULY 1974

ia

Manual for Preparation of Environmental Impact Statements for Wastewater Treatment Works, Facilities Plans, and 208 Areawide Waste Treatment Management Plans

PAGE

List of Figures..... i
Foreword..... ii

Introduction..... 1

Authority and Responsibility..... 1

Purpose..... 2
Flexibility in Organization and Content of EIS..... 2
Content of the EIS..... 3
Relationship of This Manual to Guidance for Facilities and 208 Planning..... 4
Format of Manual..... 4
Flowchart of Content of EIS..... 4

I. Background..... 6

A. Identification of Grant Applicants and/or Planners..... 6
B. Description of the Proposed Action..... 6
C. General and Specific Location of the Proposed Actions..... 6
D. Water Quality and Water Quantity Problems in the Area..... 6
E. Water Quality and Water Quantity Objectives in the Area Other Than Solutions of Preceding Problems..... 6
F. Costs and Financing..... 7
G. History of the Application..... 7

II. The Environment Without the Proposed Action..... 8

A. General..... 8
B. Detailed Description..... 8
1. Climate..... 9
2. Topography..... 9
3. Geology..... 9
4. Soils..... 9
5. Hydrology..... 9
6. Biology.....10
7. Air Quality (Air).....11
8. Land Uses.....11
9. Identification of Significant Environmentally Sensitive Areas.....11

10. Population Projections and Economic Forecasts..... 12
11. Other Programs in the Area..... 12
12. Aesthetics..... 12

III. Alternatives..... 13

A. General..... 13
1. Purpose..... 13
2. Difference in Alternatives in EIS's on Treatment Works,Facilities Plans, and 208 Plans..... 13
3. Constraints on the Consideration and Selection of Alternatives..... 13
B. Analysis of Alternatives in EIS's on Wastewater Treatment Works and Facilities Plans..... 14
1. Facilities Planning..... 14
2. General Analytical Approach..... 14
3. Subsystem Alternatives to be Considered..... 16
4. Comparative Analysis to be Performed in Developing and Selecting the Preferred System(s)..... 19
5. Additional Considerations..... 21
C. Analysis of Alternatives in EIS's on 208 Areawide Waste Treatment Management Plans..... 21
1. 208 Planning..... 21
2. General Analytical Approach..... 22
3. Alternatives to be Considered..... 22
4. Comparative Analyses to be Performed in Developing and Selecting the Preferred Plan(s)..... 24
5. Additional Considerations..... 26

IV. Descriptions of Proposed Actions..... 27
A. General..... 27
B. Description of Subsystems..... 27
1. Flow and Waste Reduction Measures..... 27
2. Sewers - Collectors and Interceptors..... 27
3. Wastewater Management Techniques..... 28
4. Sludge Disposal..... 28
C. Description of Additional Alternatives in a 208 Plan..... 28

V. Environmental Effects of the Proposed Actions.....29

A. General.....29
1. Primary.....30
2. Secondary.....30

B. Environmental Impacts.....31
1. Water.....31
2. Air.....32
3. Land.....32
4. Biology.....33
5. Environmentally Sensitive Areas.....33
6. Aesthetics.....33

C. Additional Impacts to Consider.....34

D. "No-Action" Alternative.....34

E. Summary.....34

VI. Federal/State Agency Comments and Public Participation.....35

List of Figures

Figure 1 -- Flowchart of Contents of EIS..... 5

Figure 2 -- Development and Evaluation of Alternative Wastewater Treatment Systems.....15

Figure 3 -- Development and Evaluation of Alternatives in 208 Plan EIS.....23

FOREWORD

This manual provides the framework for preparing environmental impact statements (EIS's) when required on wastewater treatment works, facilities plans, or 208 areawide waste management plans and should serve as a reference to those who must prepare such EIS's. It is intended to provide certain minimum standards of completeness and consistency in those EIS's prepared by EPA in the above categories.

This manual has been prepared pursuant to 1500.6(c)(iii) of CFQ's guidelines of August 1, 1973, which requires agencies to issue substantive guidance to agency personnel in implementing the impact statement process.

I expect this manual to serve continuously as an EIS preparation guide. It will be updated when necessary to incorporate changes and additional information as developed. To improve the usefulness of this manual, we need constructive comments and suggestions reflecting your experience in its use. Such comments should be furnished to the Director, Office of Federal Activities, 4th and M. St., SW., Washington, D.C. 20460.

Sheldon Meyers

Sheldon Meyers
Director
Office of Federal Activities

INTRODUCTION

Authority and Responsibility

The National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, requires all Federal agencies to, "...utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment...." Section 102(2)(C) of that Act also requires the agency to prepare an environmental impact statement (EIS) on, "...major Federal actions significantly affecting the quality of the human environment..." This is to be accomplished in consultation with the Council on Environmental Quality (CEQ), established by Title II of the Act.

CEQ has issued, "Preparation of Environmental Impact Statements: Guidelines," August 1, 1973 (40 CFR Chapter V, Part 1500), to guide agencies in the fulfillment of NEPA's requirements. In accordance with these guidelines, the Environmental Protection Agency (EPA) has published regulations for the preparation of environmental impact statements (40 CFR Chapter I, Part 6) on its own actions.

General criteria for deciding when to prepare EIS's are included in CEQ's guidelines (40 CFR 1500.6). More specific criteria for EPA actions can be found in EPA's regulation cited above.

One of the major EPA programs involving actions which are candidates for EIS's is the construction grants program as authorized by Title II - Grants for Construction of Treatment Works, Section 201(g)(1), of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA), (Public Law 92-500). The Act authorizes the Administrator, EPA, "...to make grants to any State, municipality, or intermunicipal or interstate agency for the construction of publicly owned treatment works...." The regional offices, in turn, have been delegated the authority to fund State-approved wastewater treatment projects.

Concurrent with all of these authorities is the responsibility to assure Federal funds will produce a project which will have maximum beneficial effects on man's environment and minimum adverse effects.

The public laws quoted above, along with the CEQ and EPA regulations, constitute the authority and responsibility for the preparation of environmental impact statements on wastewater treatment works or facilities or 208 plans when deemed necessary by the regional offices of EPA.

Purpose

The purpose of this manual is to implement the requirements in 1500.6(c)(iii) of CEQ's guidelines that each agency issue substantive guidance to agency personnel in implementing the impact statement process. This manual provides the framework for the EIS's prepared on wastewater treatment works or facilities or 208 plans. Its use will ensure certain minimum standards of completeness and a consistency in organization and content of EIS's. Standards for completeness are needed to ensure that relevant, available data and analyses are not omitted from the document. Consistency in organization and content will facilitate public and headquarters understanding of the information presented.

The manual will serve as a useful reference for those who must prepare EIS's. Use of the manual should also expedite the headquarters pre-release review of EIS's, and hopefully, as a secondary benefit reduce the need for an in-depth review at the headquarters level on every EIS prepared.

Adhering to the contents of the manual should help ensure clear and objective EIS's -- a candid discussion of the problems to be solved, all feasible alternative solutions to these problems and the environmental effects of these solutions. The CEQ guidelines (40 CFR 1500.7) are clear on the intent of the EIS process --" "....statements are to serve as the means of assessing the environmental impact of proposed agency actions rather than as a justification for decisions already made..." The presentation of facts must be made in a form and context which will allow the public to reach a decision on the merits of the proposed action on their own.

Flexibility in Organization and Content of EIS

Notwithstanding the need for uniformity in the preparation of EIS's, the organization and content of the EIS that is specified in the manual, may be altered provided that the Regional Administrator determines that the proposed action or circumstances related to it warrant such changes. The manual should not be applied so rigidly that assembly line EIS's result. One must recognize that each wastewater treatment works or plan is an individual case. EIS's should be geared to the specific complexity of the environmental problems associated with the wastewater treatment works or plan under review.

In this regard, EIS's should be as brief as practicable. To this end, if a proposed action has an obvious overriding environmental problem, the preparer should make this clear in the beginning of the EIS and concentrate on that problem and its analysis while providing summaries of the other analyses required in this manual.

The manual does not recommend techniques for forecasting the environmental effects of proposed actions. The preparers should use any forecasting techniques(s) determined appropriate.

Content of the EIS

The preparer should attempt to provide the information required by this manual to the best of his ability. However, special circumstances may prevent the inclusion in the EIS of certain data and analyses which the manual specifies should be included. Some of these circumstances are:

1. the information may simply not be obtainable;

2. the analysis or information is prohibitively difficult or expensive to obtain;

3. the available data is of questionable reliability; and

4. the material required by the manual is not applicable to the specific project under review.

In each case of omission, a concise explanation of the rationale for not having the data or analyses should be given.

Statements should incorporate relevant, analytical disciplines and should provide meaningful and factual data, information and analyses. The presentation should be simple and concise, yet include all facts necessary to permit independent evaluation and appraisal of the beneficial and adverse environmental effects of alternative actions. The style should not, however, require extensive scientific or technical expertise to comprehend or evaluate the environmental impact.

Although it is not mandatory to select a single, alternative solution to the wastewater treatment problem in the draft EIS, when analysis leads a Regional Administrator to prefer a particular alternative, he should not hesitate to make his preference known. In all final EIS's, however, the Regional Administrator must select and state a single proposed action or plan.

Circumstances may occur in which it is necessary to consider factors not included in the manual. When appropriate, the addition of this information is encouraged. Care should be taken to integrate the additional material into that already suggested by the manual.

All EIS's should contain a summary sheet as required by both the CEQ guidelines and EPA's environmental impact statement regulations.

Relationship of This Manual to Guidance for Facilities and 208 Planning

Sections 201 and 208, Federal Water Pollution Control Act Amendments of 1972, require facilities and areawide planning respectively. EPA has prepared guidance to assist applicants and their design engineers in satisfying these requirements. This manual has been prepared in conjunction with the above guidance and a plan submitted in accordance with the guidance should contain most of the material needed for preparing the EIS. However, the more extensive the communication between the regional office and the applicant before submission of the plan, the greater the chance the planning document will contain the information required for the EIS. Chapter III, "Alternatives," of this manual discusses the differences in the consideration of alternatives in EIS's on wastewater treatment works, facilities plans, and 208 plans.

Format of Manual

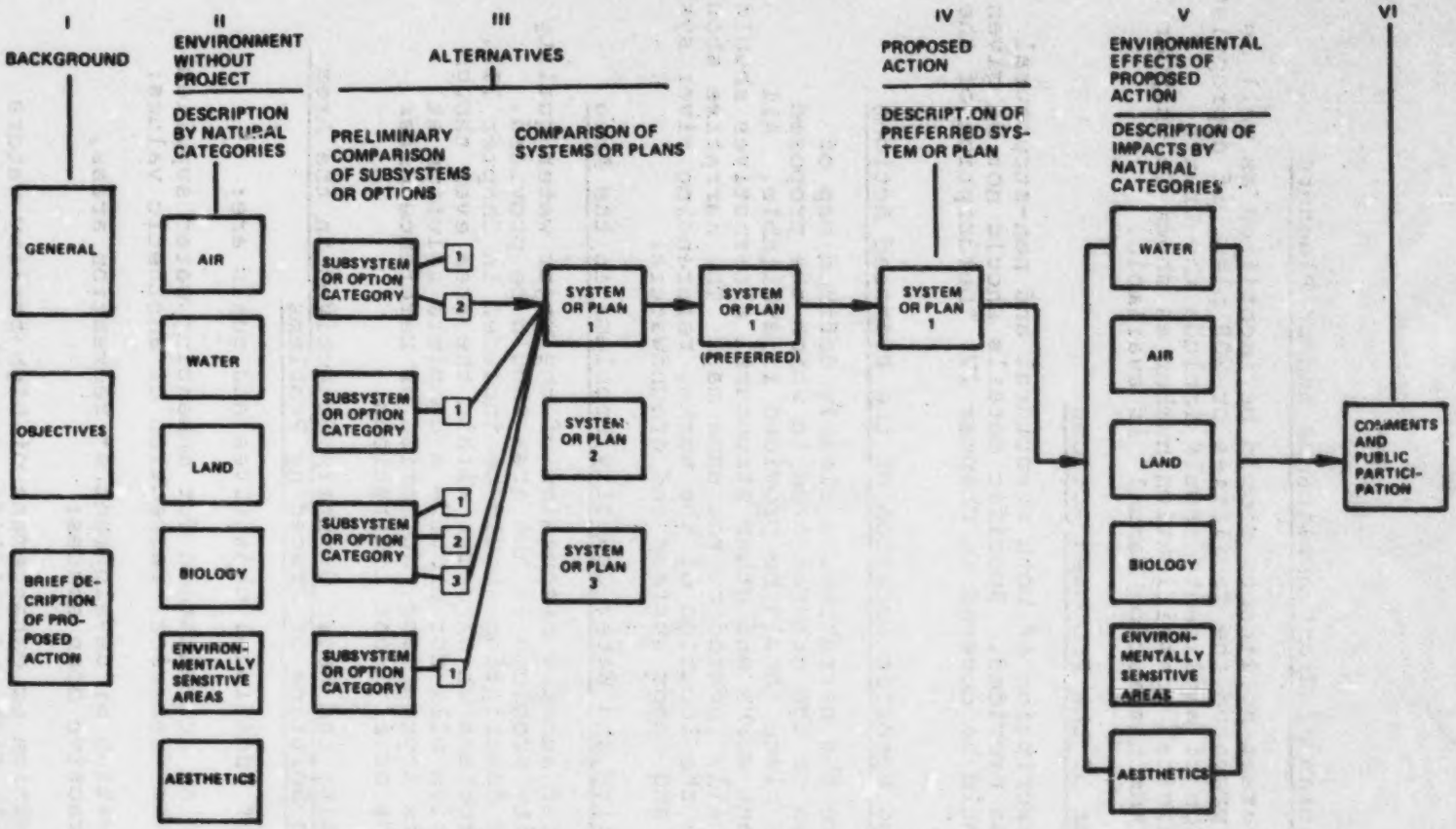
The order of chapters in the manual does not follow the specific order of the "Contents of EIS's" as stated in the CEQ guidelines -- the significant difference being the Alternatives Chapter is located near the beginning, before the discussion of the proposed action. This was done to place more emphasis on the development of alternatives rather than on the justification of the proposed alternative. The Alternatives Chapter provides a logical exposition of the development of the proposal -- explaining the problems and constraints, the subsequent evaluation of possible solutions and finally, the selection of the proposed alternative. Because of the changed order only a brief summary of the proposed action should be provided in the Background Chapter of the EIS.

Flowchart of Content of EIS

Figure 1 is a flowchart to assist in visualizing the systematic gathering of information for the EIS and the processing of that information into the completed document.

FIGURE 1

FLOWCHART OF CONTENTS OF EIS



I. Background

A. Identification of Grant Applicants and/or Planners

Potential grant applicants should be identified as well as the entity that prepared the facilities or 208 plan, if appropriate. The identification of applicants should include the Grants Administration digital identification number as shown in Chapter 12, Part I, "Grants Administration Manual" if available.

B. Description of the Proposed Actions

A brief description of both structural and non-structural actions should be provided. Specific details should not be given here. These should be covered in Chapter IV, "Description of the Proposed Action."

C. General and Specific Location of the Proposed Actions

To minimize the narrative, a clearly defined map of the planning area or the general area in which the proposed action will take place should be provided if available. All relevant treatment works and other structural alternatives should then be specifically located on the same map. The narrative should briefly describe the location of the works, referencing river systems, drainage basins and major surface and groundwaters.

D. Water Quality and Water Quantity Problems in the Area

A very brief summary discussion of the major water quality and water quantity problems in the area should be provided. (A more detailed description should be included in Chapter II). Include those problems which occur within the area even though the proposed action will not provide a complete solution at this time. Where appropriate, summarize or reference water quality standards or effluent limitations.

E. Water Quality and Water Quantity Objectives in the Area Other Than Solution of Preceding Problems

Examples of additional objectives and goals are:

1. streamflow augmentation for enhancing water supplies downstream, stream fisheries, recreation or aesthetic values;

2. preservation or development of recreation areas, wetlands or attractive open spaces;

3. preservation or enhancement of high quality waters with recreational, fish and wildlife or aesthetic values;

4. groundwater recharge for augmenting water supply and/or preventing salt-water intrusion;

5. alleviation of groundwater pollution; and

6. reuse of treated wastewater such as recycling of nutrients in treated wastewater.

F. Costs and Financing

Enumerate the total anticipated cost, the amount eligible for a grant under Section 201(g)(1), Public Law 92-500 and the Federal and State dollar contributions and percentages of the total cost each will pay if the proposed actions are recommended and approved.

G. History of the Application

If a grant application has been received, briefly describe the origin of the application, its priority determination and State certification.

II. The Environment Without the Proposed Action

A. General

The social, economic and environmental setting of the area of the proposed action is important for the decision maker and the public. The environmental setting is the starting point from which forecasts of the environmental impact of the proposed action must be made. The same environmental categories used in this chapter to describe the environmental setting are used in Chapter 5, "Environmental Effects of the Proposed Action," to describe the environmental impacts after implementing the proposed actions. While the focus should be on the immediate area of the proposed actions, where appropriate, parts of the surrounding area should also be included to avoid the risk of overlooking any important interbasin or regional impacts.

The importance of using maps to illustrate topics is stressed--especially where environmentally sensitive areas are concerned. The narrative should be concise, not exhaustive. Only those characteristics of the social and environmental setting which are most important in relationship to the proposed action should be discussed in any detail, and those which are not particularly relevant should be omitted.

B. Detailed Description

The environmental description should include the following items when they are relevant to the analysis of alternatives or determination of environmental impacts of the proposed action. Note that in many instances certain of these items will not be relevant to the decisions to be made, or their significance can be appropriately covered by a very brief description. See the note below for mandatory items.

NOTE: Only those items with asterisks need be included in all EIS's.

1. Climate

Describe the climatic conditions for the general area of the proposed actions including temperature, precipitation, humidity, and wind direction and velocity. List any specific weather conditions, such as inversions, fog, tornadoes, and hurricanes, and the frequency at which they may be anticipated. Also describe any topographic features which influence the weather.

2. Topography

Describe the topography of the area of the proposed actions delineating the major and minor drainage basins along with their characteristics--area, slope, elevation, natural and artificial drainage nets, erosion, and deposition.

3. Geology

Describe the geology of the appropriate area. Geologic structures or formations that have a direct influence on either groundwater or surface water resources should be specifically mentioned. Areas which are particularly susceptible to earthquakes, landslides, subsidence or other earth movement should be located on an area map and described briefly.

4. Soils

Identify soil types and their permeability, erosion potential, expansion, compaction and other characteristics in the appropriate areas.

5. Hydrology (Water)

a. General

Describe the relevant surface water bodies and groundwater aquifers in the area.

b. Water Quality

Describe the existing surface and groundwater quality using physical, chemical and biological parameters.

c. Water Quantity

Describe the existing surface and groundwater quantity and relate to water uses in section e below. Include a discussion of surface water volume, stream flow rates and the frequency and duration of seasonal variations (specify the 7-day 10-year low flow, groundwater storage volume or extent and depth of the major aquifers, and their rate of recharge and/or depletion. Where relevant to decision making the following material should also be included. If regulating (dams; locks) or diversion (dams; tunnels; canals) structures are in place, or proposed, these should be identified. Structures influencing stream-flow should be located on an area map; the recharge areas for replenishing ground water should also be identified on this map.

***** d. Water Quality and Quantity Problems

Identify existing and potential water quality and quantity problems in the area. Address specifically the relevant point and non-point sources of pollution such as those arising from industry, municipalities, combined sewers, storm water run-off, agriculture, silviculture, aquaculture, mines or mine drainage, and salt water intrusion.

***** e. Water Uses

Describe the type and extent of existing and future surface and groundwater uses. If reuse or reclamation of water is practical in the area, this should be explained. Regulatory and administrative procedures in force to reduce water consumption (thereby reducing waste volume) should be noted if significant.

***** f. Water Quality Management

Describe or reference all pertinent areawide or basin water quality management plans, court ordered allotments or interstate compacts involving water quality/quantity in the project area. If State or local water pollution control agencies have issued permits or orders on specific water resources, these should also be identified.

g. Flood Hazards

Indicate the 25, 50 and 100-year flood levels for the area. Identify any Corps of Engineers flood-plain plan or proposed project.

6. Biology

a. Indicate those species in the area which have been designated rare or endangered, either at the State level or nationally.

b. Describe wildlife habitat or portion thereof which might be affected by the project.

***** 7. Air Quality (Air)

To the extent pertinent discuss the major factors directly affecting air quality and the current and anticipated future air quality in the project area. Identify and reference the air implementation plan for the area.

8. Land Uses - The following should be provided any time interceptors or collectors are being proposed to service presently undeveloped areas or will be routed through such areas. The material should be prepared in conjunction with that required in Chapter V, Section B.3.

a. If available, include a map of existing land uses such as residential, commercial and services, industrial, cluster housing, strip development, extractive (mining, etc.), transportation, communications and utilities, institutional, open space and outdoor recreation, agricultural, forest land, water, archaeological, historical and other points of interest in the area of the interceptors.

b. If available, include a map of land uses, both private and public, for those categories listed above, which are currently being proposed by local, State, national or regional governments in the areas of the interceptors.

c. Describe the extent and effectiveness of current land use planning by all levels of government.

d. Describe the administrative and regulatory land use controls now in effect.

e. Describe development trends for the industrial, agricultural, commercial, residential, and recreational sectors -- especially those near or around bodies of water.

f. Describe any aspects of these trends which might threaten air or water quality or bring about other environmental problems.

***** 9. Identification of Significant Environmentally Sensitive Areas

Identify and show on a map any of the following which may be significantly impacted by the proposed action, and which are not described elsewhere in this chapter:

1. surface waters,
2. marshland, wetlands, and estuaries,
3. flood plains or flood-retention areas,
4. groundwater recharge areas,
5. steeply sloping lands,
6. forests and woodlands,
7. prime agricultural lands,
8. habitats of rare and endangered species,
9. public outdoor recreation areas,
10. sensitive geologic areas, and
11. archaeological and historic sites.

***** 10. Population Projections and Economic Forecasts

Designate the current and projected population levels (5, 10, and 20 years). In discussing these population trends, the rates of growth for the region contained in reports for the Water Resources Council by the Bureau of Economic Analysis, Department of Commerce and the Economic Research Service, Department of Agriculture (the OBERS projections) should be considered. The reasons for using a particular projection or forecast should be stated briefly.

***** 11. Other Programs in the Area

Describe local, State, and Federal projects, planned or underway which have or will have an impact (social, economic, or environmental) on the area, if there will be a major interaction between these projects and the proposed water quality action. Also discuss the interaction.

12. Aesthetics

Describe the area's general aesthetic quality. Where appropriate, discuss noise levels, man-made objects, other items not handled elsewhere, and the overall "composition" mirrored by the total aesthetic picture.

III. Alternatives

A. General

1. Purpose

The chapter on "Alternatives" should contain:

a. a systematic development of all feasible alternatives for the solution of the identified water quality problems; and

b. a rational comparison of all feasible alternatives, including the identification of critical differences leading to the selection of one (or more) alternative(s) over another.

Both the development and comparison should be presented in a clear and concise manner so the reader can follow the logic of the Agency's decision-making process. A single preferred alternative representing the Agency's proposed action does not have to be selected in the draft EIS but must be selected in the final EIS.

The type of information to be included, how it should be presented to the reader, and guidance for the alternative to be developed and comparison processes are contained herein.

2. Differences in Alternatives in EIS's on Treatment Works, Facilities Plans, and 208 Plans

The types of alternatives that should be included in an EIS will depend in part on whether it is an EIS on a treatment work, facilities plan, or 208 plan. A description of what should be considered in the alternatives section in each of the above kinds of EIS's is discussed in Sections B and C below.

3. Constraints on the Consideration and Selection of Alternatives

Regardless of the type of EIS, the alternatives section should contain a discussion of limiting factors, assumptions, or conditions that affect the scope of alternatives considered or analyses performed. These constraints may be sufficient reason to reject a large number of alternatives outright, eliminate a portion of the analysis without further consideration, or they may reflect on the effectiveness or scope of available alternatives. Examples of such constraints include:

a. the proposed treatment work is intended to demonstrate a particular technology (example: nitrogen removal);

b. a substantial investment in existing facilities may preclude certain alternatives;

c. the treatment work is limited in scope and only a partial analysis is necessary (example; modification of an existing facility); and

d. an EIS has already been prepared adequately covering certain portions of the facility, problem, or area and need not be repeated in this evaluation, except by reference (example: EIS on the effects of ocean outfalls -- over an extensive portion of a coastline). The region may in fact, wish to prepare similar standard or generic EIS's to preclude having to repeat the same material in each EIS to be prepared.

B. Analysis of Alternatives in EIS's on Wastewater Treatment Works and Facilities Plans

1. Facilities Planning

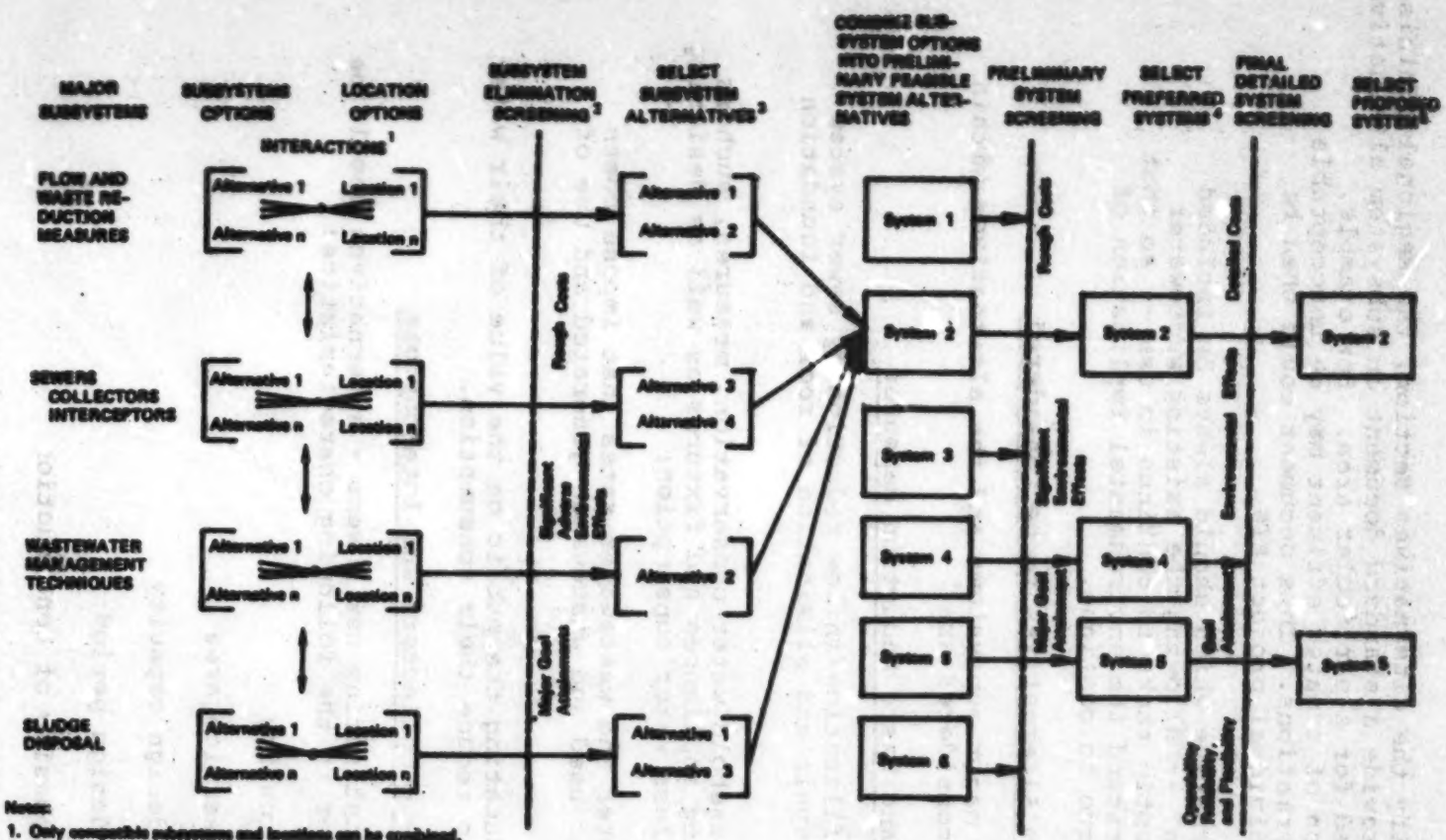
Facilities planning is designed to provide for cost-effective, environmentally sound and implementable treatment works which will meet the applicable requirements of the Federal Water Pollution Control Act Amendments of 1972. The major emphasis is on the prevention and solution of point source water quality problems. Alternatives developed to accomplish this are technical alternatives, and include both structural and non-structural alternatives.

2. General Analytical Approach

Alternatives for EIS's on treatment works and facilities plans should be systematically developed and selected through a combination of subsystems and systems analysis. The analysis should be broken down into the structural and nonstructural subsystems specified in section 3. For each subsystem there are a number of alternatives available to the design engineer. These subsystem alternatives should be screened and compatible subsystems should be combined into system alternatives. Finally, a preferred system(s) is selected after a more detailed comparative analysis or screening process. The entire process is shown schematically in Figure 2.

FIGURE 2

DEVELOPMENT AND EVALUATION OF ALTERNATIVE WASTEWATER TREATMENT SYSTEMS



Notes:

1. Only compatible subsystems and locations can be combined.
2. If there is an overriding reason for rejecting a subsystem, all factors need not be evaluated.
3. Only compatible subsystems can be combined.
4. The preferred systems are used to develop subplans in a 208 plan EIS.
5. In the draft EIS more than one system alternative may be proposed.

To simplify the alternatives section, the Regional Administrator may wish to provide a standard document on subsystem alternatives which must be rejected for a particular area. For example, shallow well injection of treated effluent may be unacceptable due to groundwater formations. This document could then be referenced in the individual project EIS.

One alternative which should always be included is that of "no action" -- allowing the existing wastewater treatment works or septic tanks to continue in use -- so that the public will understand the environmental implication of allowing the status quo to continue.

3. Subsystem Alternatives to be Considered

The four major subsystems and the alternatives within each that should be considered are:

a. Flow and Waste Reduction Measures

1) infiltration/inflow reduction by sewer system rehabilitation and repair and elimination of roof and foundation drains;

2) household water conservation, measures, such as household water saving appliances and fixtures as well as designing more appliances for less water consumption;

3) water and wastewater rates that impose costs proportional to water used and wastewater generated and use of water meters; and

4) educating the public on the value of their water resources in order to reduce their consumption.

b. Sewers - Collectors and Interceptors

1) Constructing new sewers - alternatives should be developed which differ in the following characteristics:

- routing
- service area
- design capacity
- design period
- phasing of construction

2) Rehabilitation of existing sewers

c. Waste Management Techniques

Alternative waste management techniques should be evaluated to determine the BPWTT[1] for meeting applicable effluent limitations including those related to wasteload allocation. Information pertinent to this evaluation is contained in an EPA document entitled, "Alternative Waste Management Techniques for Best Practicable Waste Treatment" (Proposed in March 1974). Selection of a waste management technique relates closely to the effluent disposal choices that are available. Preliminary alternative systems featuring at least one technique under each of the three categories below (treatment and discharge, wastewater reuses, and land application or land utilization) will be identified and screened, unless adequate justification for eliminating a technique during the screening process is presented.

1) Treatment and Discharge to Surface Waters

Treatment techniques are specified below. Alternative sizing, phasing of construction, and location of treatment works should also be compared.

- Biological treatment including ponds, activated sludge, trickling filters, processes for nitrification, and denitrification.

- Physical-chemical treatment including chemical flocculation, filtration, activated carbon, break-point chlorination, ion exchange, and ammonia stripping.

- Systems combining the above techniques.

- The "no action" alternative such as using septic tanks or not upgrading an existing treatment plant should always be considered for the sake of comparison.

Surface waters can include: rivers, streams, lakes, estuaries, bays, and the ocean. In EIS's where surface discharge is the most promising alternative, a number of different discharge points should be considered.

2) Wastewater Reuse

In comparing waste management techniques and alternative systems, wastewater reuse applications should be evaluated as a means of contributing to local water management goals. Such applications include:

1/ Best practicable waste treatment technology.

- Industrial processes

- Groundwater recharge for water supply enhancement or preventing salt-water intrusion

- Surface water supply enhancement

- Recreation lakes

- Land reclamation

Wastewater reuse needs should be identified and defined by volume, location, and quality. These needs may influence the location of the treatment facilities, the type of process selected, and the degree of treatment required.

3) Land Application

The application of wastewater effluents on the land involves the recycling of most of the organic matter and nutrients by biological action in the soil plus plant growth for the breakdown and disposal of nutrients. Such treatment generally provides a high degree of pollutant removal. Planning of the land application techniques should reflect criteria and other information contained in the EPA document on "Alternative Waste Management Techniques for Best Practicable Waste Treatment." Different locations for land application should be considered in the analysis.

Land application techniques include:

- Irrigation including spray, ridge and furrow, and flood

- Overland flow

- Infiltration-percolation

- Other approaches such as evaporation, deep well injection, 1/ and subsurface leach fields.

d. Sludge Disposal 2/

The alternatives in each of the categories below should be considered. Alternative sites should also be compared.

1/ Refer to Administrator's Decision Statement No. 5, Feb. 6, 1973, for guidance.

2/ The letters identify the various stages in sludge handling and disposal. The alternatives available for each step are arrayed below each stage.

1) sludge stabilization

-- aerobic and anaerobic digestion

-- composting

-- chemical treatment

-- physical processing

2) other processes

-- thickening

-- conditioning

-- dewatering

-- heat treatment for disinfection

-- drying

3) final disposal

-- incineration

-- land spreading, or other land application methods

-- landfill

-- pyrolysis

-- composting

-- ocean 1/

-- deep well injection

4. Comparative Analysis to be Performed in Developing and Selecting the Preferred System(s)

A number of comparative analyses or screens should be conducted during the systematic development of system alternatives. The basic comparisons to be made in each screen are discussed below.

1/ Refer to EPA - "Ocean Dumping" - Final Regulations and Criteria, Federal Register, Vol. 38, No. 198, Part II (40 CFR, Chapter I, Subchapter H - Part 220 - 227), October 15, 1973.

All comparisons should be discussed in narrative form and displayed in a summary chart. The major reasons for acceptance or rejection of an alternative should be stated in each case.

a. Subsystem Elimination Screening

Subsystem alternatives should be initially screened to eliminate those that are not feasible. The screening should consist of a comparison of the subsystem alternatives with respect to:

1) solution of major water quality problems and progress toward other identified objectives or goals;

2) significant adverse environmental effects; and

3) rough capital, maintenance and operating costs. 1/

In many instances, the interaction of subsystems will be such as to require their selection on the basis of a preferred combination rather than on the basis of an individually preferred subsystem. For example, the method of effluent disposal will determine the level of treatment needed. A few of these interactions are shown in Figure 2 as arrows between the subsystems.

b. Development and Preliminary Screening of Systems

Following the selection of a set of subsystems and subsystem locations, subsystems should be combined into feasible system alternatives. A preliminary systems screening should then be conducted to identify the best of the system alternatives. The same comparisons made during the subsystem screening should be made for this screening.

c. Final Detailed Systems Screening

The systems remaining after the preliminary screening will be compared in more detail on the basis of:

1) contributions to water quality goals and objectives;

2) present value or average annual equivalent value of capital and operating costs for overall alternative and subsystem components;

3) significant environmental effects of each alternative including a specific statement on future development impacts; and

4) operability, reliability and flexibility of each alternative and any subsystem included in each alternative.

1/ Unless subsystem alternatives have been rejected on a cost basis, it is not necessary to prepare cost comparisons until system alternatives are considered.

5. Additional Considerations

When there are overriding and obvious reasons for rejecting an alternative, it is not necessary to develop all of the above comparisons.

When there is no perceptible difference between alternatives during the comparison process, a statement to that effect is sufficient.

If a system contains a subsystem component designed for a period less than the life of the entire facility, at which time it will be replaced or upgraded, the comparative analysis should reflect this. The discussion should also emphasize those alternative systems that appear promising in terms of environmental protection. Different designs for systems that are essentially identical with respect to environmental effects should be considered only if their costs are appreciably different.

The concept of centralized vs. decentralized systems is receiving increased attention in current system proposals. When evaluated on the cost of the facilities alone, the analyses often neglect to discuss adequately the residential, commercial and industrial development that a centralized project can induce. Their vast network of collectors and interceptors often open up many new areas for development, or more rapid growth. The final system screening should specifically speak to these environmental implications of each system.

C. Analysis of Alternatives in EIS's on 208 Areawide Waste Treatment Management Plans

1. 208 Planning

208 planning entails both technical planning, which includes identifying water quality problems and developing alternatives to solve them, and management planning, which includes determining jurisdictional, management, or authority problems, and developing a management system to implement the proposed technical alternatives. The EIS on a 208 plan should concentrate on the technical alternatives, although some outputs of the management planning are likely to be included as objectives or constraints.

The technical alternatives considered in an EIS on a 208 plan should include those designed to solve or prevent both point source and non-point source water quality problems. These technical alternatives should encompass both structural and non-structural alternatives. Land use considerations play an

important part in this planning. An important difference between the alternatives considered in an EIS on a 208 plan and a facilities plan is that the latter's alternatives are limited primarily to point source alternatives.

2. General Analytical Approach

The analysis of alternatives in an EIS on a 208 plan will be much more extensive than that required on a facilities plan. The entire process for a 208 plan is shown in Figure 3. The analysis is broken up by types of sources. Alternatives are compared and developed in the categories where there are identified problems. Preliminary comparisons are conducted in two categories - municipal wastewater treatment facilities and nonpoint source discharges. For the former the preliminary analysis is identical to that which would be performed in a facilities plan. For the latter, unfeasible options are eliminated with a preliminary screening analysis. After the preliminary analyses, the remaining systems or options within each of the categories are combined into subplans, which are screened to select the best. Finally, the subplans remaining after the screening are combined into areawide plans. These are then screened to yield the proposed plan.

3. Alternatives to be Considered

Alternatives to be considered are specified below.

a. Point Source Alternatives

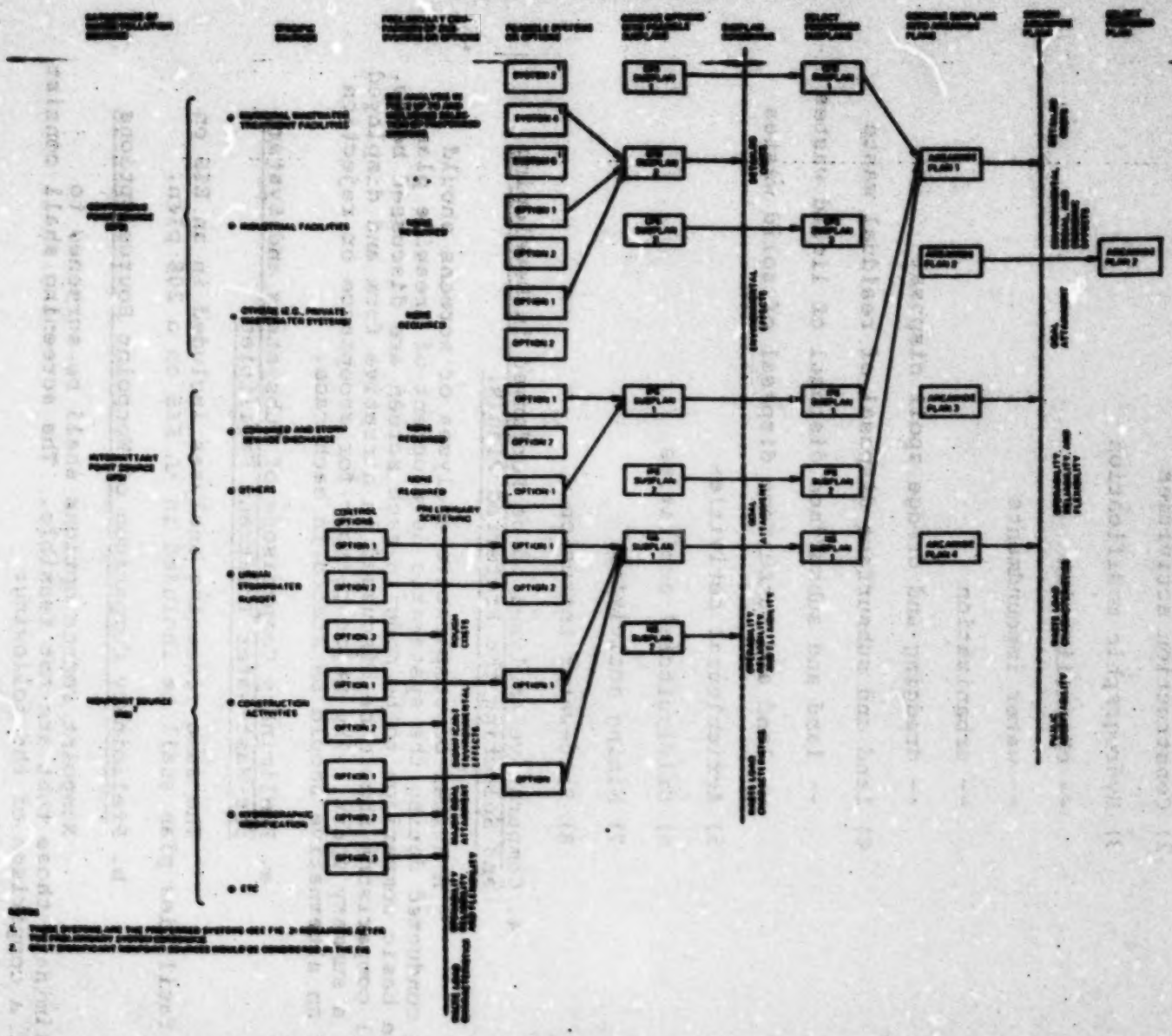
The point source alternatives associated with municipal wastewater treatment facilities, both structural and non-structural, that should be discussed in an EIS on a 208 plan are the same ones that should be discussed in an EIS on a facilities plan. Similar alternatives should be compared for industrial and other facilities when appropriate. Alternatives for intermittant point sources should be developed on a case by case basis. A minor difference in terminology between the facilities and 208 planning guidance exists; the term systems alternative used in this manual and the facilities planning guidance is referred to as point source subplan in the 208 guidance.

b. Nonpoint Source Alternatives

A number of nonpoint source alternatives both structural and non-structural, designed to prevent or alleviate nonpoint source water quality problems, should be considered in an EIS on a 208 plan. The alternatives that should be considered are those that are included in the "Guidelines for Areawide Waste Treatment Management" under the following categories, when those categories are applicable to problems that have been identified:

FIGURE 3

DEVELOPMENT AND EVALUATION OF ALTERNATIVES IN 208 PLAN EIS



1) Urban stormwater runoff

2) Construction activities

3) Hydrographic modification

-- channelization

-- water impoundments

-- urbanization

-- dredging and dredge spoil disposal

4) Land and subsurface disposal of residual waste

-- land and subsurface disposal of liquid wastes

-- land and subsurface disposal of solid wastes

5) Agricultural activities

6) Silvicultural activities

7) Mining activities

8) Salt-water intrusion

4. Comparative Analyses to be Performed in Developing and Selecting the Preferred Plan(s)

A number of comparative analyses or screens should be conducted during the systematic development of areawide plans. The basic comparison to be made in each screen are discussed below. All comparisons should be discussed in narrative form and displayed in a summary chart. The major reasons for acceptance or rejection of an alternative should be stated in each case.

a. Preliminary Comparisons of Subsystems and Systems for Wastewater Treatment Facilities

The same screening analyses included in an EIS on a facilities plan shall be included in an EIS on a 208 plan.

b. Preliminary Comparison of Nonpoint Source Options

Nonpoint source options shall be screened to eliminate those that are not feasible. The screening shall consist of a comparison of the following:

1) contributions to major water quality goals and objectives of each alternative;

2) rough costs;

3) significant environmental effects of each alternative;

4) operability, reliability and flexibility of each alternative; and

5) waste load characteristics of each alternative expressed in appropriate units for relating to the water quality prediction model.

c. Development and Screening of Subplans

Systems and other options remaining after any preliminary analyses shall be combined into subplans for each category of pollution source. The subplans shall then be screened to select the best. The screening shall consist of the following comparisons:

1) contributions to water quality goals and objectives;

2) present value or average annual equivalent value of capital and operating costs for overall alternative and any subsystem components;

3) environmental effects of each alternative including a specific statement on future development impacts;

4) operability, reliability and flexibility and

5) wasteload characteristics of each alternative expressed in appropriate units for relating to the water quality prediction model.

d. Development and Screening of Areawide Plans

The subplans remaining after the subplan screening shall be combined into areawide plans. These in turn shall be screened to select the preferred plan(s). The screening shall consist of a comparison of the same factors used to screen subplans with the addition of:

1) economic and social effects; and

2) public acceptability.

5. Additional Considerations

It is not necessary to repeat the same comparisons in the narrative with each screening process. They need only be briefly noted in the summary chart. The major reason for favoring or rejecting an alternative should always be stated, however.

IV. Description of Proposed Actions

A. General

Both structural and non-structural proposed actions should be described. Depending on the type of EIS, the description should be approached in different ways. For EIS's on wastewater treatment works and facilities plans, the actions should be described in terms of their subsystems. For EIS's on 208 plans, subsystem descriptions should be used when the alternatives making up the plan are like those in a facilities plan. Other alternatives making up the 208 plan should be described in any fashion that is appropriate.

B. Description of Subsystems

The content of the description of each subsystem comprising the proposed action is discussed below. When applicable, the reliability of unit processes should be noted (reference EPA-430-9974-001), especially those design features involved with controlled diversions. If a site plan is available for a structural subsystem it should be provided.

If energy conservation features have been included in the proposed action, these should be described. Examples are the use of processed digester gas as a fuel source or the selection of equipment which minimizes energy consumption.

The Regional Administer may wish to prepare standard descriptions of widely accepted subsystems for use in EIS's. This would reduce the amount of repetitive writing needed for individual EIS's.

1. Flow and Waste Reduction Measures

Describe how the proposed action(s) will be implemented and what the likelihood of success is.

2. Sewers - Collectors and Interceptors

Provide a map of the collector and interceptor network which can be easily compared with the land use map provided in Chapter II. If collectors or interceptors, or both, are planned for an area which is not currently developed, the reason for providing service should be discussed. Include the capacity, size, design period, any phased construction, and other features.

3. Wastewater Management Techniques

Describe the treated effluent disposal system including the location, type, size, design period and other features. If disposal is to the ocean or by well injection, applicable regulations must be considered. Effluent quality, water quality standards, effluent limitations and the maximum daily load of pollutants for receiving waters should be adequately discussed.

Describe the basic wastewater treatment plant with a minimum of engineering detail to avoid confusing a lay audience. Include the size, type, location, design period, any phased construction and other features. Describe influent to the plant and the treatment and hydraulic capacity of the plant in relation to water quality standards and the current population of the community. Include the explanation of any excess capacity. Identify any recirculation systems which will increase plant efficiency.

4. Sludge Disposal

Describe the sludge treatment, conditioning and disposal processes, including the location, type, size design period and other features. If disposal is to the ocean, applicable regulations must be considered.

C. Description of Additional Alternatives in a 208 Plan

Discuss the additional alternatives that make up the proposed areawide plan in any fashion that is appropriate.

V. Environmental Effects of the Proposed Actions

A. General

This chapter of the EIS is second in importance only to the chapter on Alternatives. Both the beneficial and detrimental environmental effects of the proposed action should be discussed in detail. Where the action will measurably improve or enhance the environment, the effects should be explained. Where an adverse environmental effect is probable, the steps taken to mitigate the results should also be discussed.

While there is no optimum approach for systematically identifying and describing the complete environmental effects of the proposed action, the approach outlined below is recommended. In this approach, the environment is divided into natural categories--the same as those appearing in Chapter II, "The Environment Without the Proposed Action":

-- Water

-- Air

-- Land

-- Biology

-- Environmentally Sensitive Areas

-- Aesthetics

By using the same natural categories appearing in Chapter II, a direct comparison can be made between the environment before and after the project is installed.

In narrative form this chapter should describe the environmental impact of the proposed structural and non-structural actions on each natural category and its subsections. In many cases, the impact on a category and subsection may be associated with a single option, alternative or subsystem. However, if more than one subsystem or alternative impacts a category, the cumulative impact should be described. The subsystem or alternative contributing to the impact should always be identified. Impacts should be characterized as:

-- beneficial or adverse;

-- short or long-term;

-- reversible or irreversible; and

-- primary (direct) or secondary (induced).

Examples of adverse, long-term, irreversible impacts that should be carefully reviewed are:

1. Primary

a. destruction of historical, archaeological, geological,cultural, or recreational areas;

b. contamination of groundwater aquifer from failure or through saltwater intrusion;

c. destruction of sensitive ecosystems (e.g., wetlands);

d. materials consumed in construction and operation: chemicals in treatment process, consumption of energy, construction materials;

e. eutrophication of a body of water;

f. jeopardizing an endangered species;

g. displacement of population; and

h. operational accidents (e.g. chemical spills).

2. Secondary

a. changes in the rate, density, or type of development, including residential, commercial, industrial, or changes in the use of open space or other categories of land;

b. air or water quality standard violations stemming from secondary development; and

c. damage to sensitive ecosystems (e.g. wetlands) or jeopardy to endangered species, resulting from the secondary growth.

B. Environmental Impacts

To reduce the length of this chapter, only selected natural categories will be explored in detail with examples.

1. Water

a. Water Quality

The wastewater treatment plant and treatment effluent disposal subsystems affect water quality, as explained in the following example: The improvement of surface water quality by a higher degree of wastewater treatment would be an environmental benefit. The same high degree of treatment might reduce turbidity and BOD to the point where algae could grow (possible detriment) while the nutrients (nitrates or phosphates) that had not been removed might accelerate this growth. Consequently, there could be a short-term improvement in water quality which would result in a long-term adverse impact. Both would most likely be reversible, however.

The sludge disposal subsystem also affects water quality, as explained in this example. Proper sludge disposal on land would prevent surface water quality degradation over the long-term. If the water table were overlain by pervious strata, however, the quality of the groundwater might suffer over the long-term. Once contaminated the effect would probably be irreversible.

b. Water Quantity

The treated effluent can affect water quality, as explained here: The return of treated effluent to the surface watercourse might produce sufficient flow to allow several beneficial downstream uses over the long-term (recreation, fishery, water supply). By not selecting groundwater recharge as a treated effluent disposal method, threaten future supply (detriment). While depletion can be reversed, once contamination of the aquifer occurs it is not easily corrected.

The same review can be performed on the remaining subsections of this natural category (see below). The relationship between the project environment and the subsystem becomes clear rather quickly. Experience in

writing the EIS will probably reduce the individual number of assessments to be made.

c. Water Quality Problems - examples will not be provided.

d. Water Uses - examples will not be provided.

e. Water Quality Management - examples will not be provided.

2. Air

An important factor to consider here is the effect on air quality of the increased availability of sewers in undeveloped areas. High population densities bring improved roads, more motor vehicle miles and finally a decrease in air quality. If the air quality in the project area is marginal, the project may produce air pollution while solving a water quality problem. The air pollution impacts may be adverse, of long-term duration, and irreversible. The proper incineration of sludge (without violation of air quality standards) is a complex problem. The design of air quality standards) is a complex problem. The design and operation of the unit must also consider the water quality (scrubbers) and solid waste (ash) problems involved. Impacts here might be reversible with an appropriate process change.

3. Land

The total picture of land use and the inherent environmental impacts should be explored. This category is especially impacted by new treatment capacity and sewers. Where excess capacity or where sewering of undeveloped areas may encourage population increases, the full importance of this development on air and water quality should be detailed in those categories. Site selection for the proposed actions should be discussed and mitigating steps explained where adverse impacts are involved.

It is especially important to evaluate the effects of collector and interceptor sewers on the probable growth within the project area when the proposed sewers will service or must traverse undeveloped or sparsely developed areas. If these conditions exist the following material should be provided. It should be prepared in conjunction with that in Chapter II, Section B. 8.

a. Maps

If these are available, include in the EIS maps of:

1) existing land uses with existing and proposed sewers, and

2) planned land uses.

These maps may be presented as overlays or any other suitable display technique.

b. Analysis of Land Use

With the above maps, determine those areas where the greatest probability exists for sewers to induce a change in land use either existing or proposed. The evaluation should discuss the anticipated rate of change of development both existing and proposed, population densities and how the design capacity of the sewers and the phasing of construction thereof might influence these considerations. Relate these possible changes in land use to the probable environmental, economic and social effects of the change. Discuss the reliability of existing or proposed zoning to adequately control development in the open space or lightly developed land areas.

c. Identification of Potential Problems

Where a land use plan for the area exists, there should be a brief discussion of the consistency of anticipated growth within the project area and the growth forecast by the plan.

Where land use plans and maps are sketchy or unavailable, an evaluation of the above factors should be made -- within the ability of the region to do so.

4. Biology - examples will not be provided.

5. Environmentally Sensitive Areas - examples will not be provided.

6. Aesthetics

Aesthetics is an elusive quality, difficult to evaluate and virtually impossible to value. However, aesthetics is a very essential part of a quality environment and society has become increasingly critical of those actions which will erode that quality in any way. This part should advise the public and the decisionmaker what the

consequences of the action will be on the aesthetics of the area. This will necessarily be a subjective analysis.

C. Additional Impacts to Consider

The outlines provided in (B) above are not all inclusive. The preparer may find it appropriate to expand or decrease the factors to be considered in each category.

The process of project site selection should be examined in detail. This determination cuts across and impacts several categories. For example, some European countries have felt it was important enough environmentally to place the entire wastewater treatment plant underground. This was admittedly brought about by severe population densities, but points out that techniques are available to effect some very unconventional approaches to solve potentially adverse environmental impacts.

Where the engineering design has incorporated important environmental benefits, these should be given credit through an adequate exposure in the narrative. For example, energy conservation design for fuel.

D. "No Action" Alternative

The environmental impact (short and long-term) of allowing existing wastewater treatment works to continue without modification, upgrading or replacement, should be discussed, so the reader can compare the impacts of the proposed action to this alternative.

E. Summary

In addition to the narrative, the environmental impacts occurring in each environmental category should be displayed in a summary chart.

VI. Federal/State Agency Comments and Public Participation

The participation of local, State, and Federal agencies, individual citizens and interested environmental groups, in the review of environmental impact statements is of the utmost importance. Their suggestions, criticisms and objections should be given full consideration.

In general;

1. the EIS should cite and discuss each substantive suggestion, criticism or objection;

2. the author(s) of each comment should be identified;

3. if a comment has resulted in a change in the project or the EIS, the impact statement should say so and identify the change;

4. if a comment has been rejected, the EIS should explain the reason for rejection; and

5. a copy of any substantive comment (or summary thereof if the comment is voluminous) received on the draft statement must be attached to the final statement.

Agency and public participation in the review of the proposed action, through formal public hearings, should be identified and briefly discussed. If public hearings have not been held, or are not anticipated, this fact should also be noted.

The EIS should contain a complete reference of any hearings related to the proposed action. The reference should state the official title, time, date and place of the hearing and the specific reason why it was held. A summary of the hearing should be appended to the EIS.

If a public hearing is anticipated subsequent to the publication of the EIS, this should also be noted.